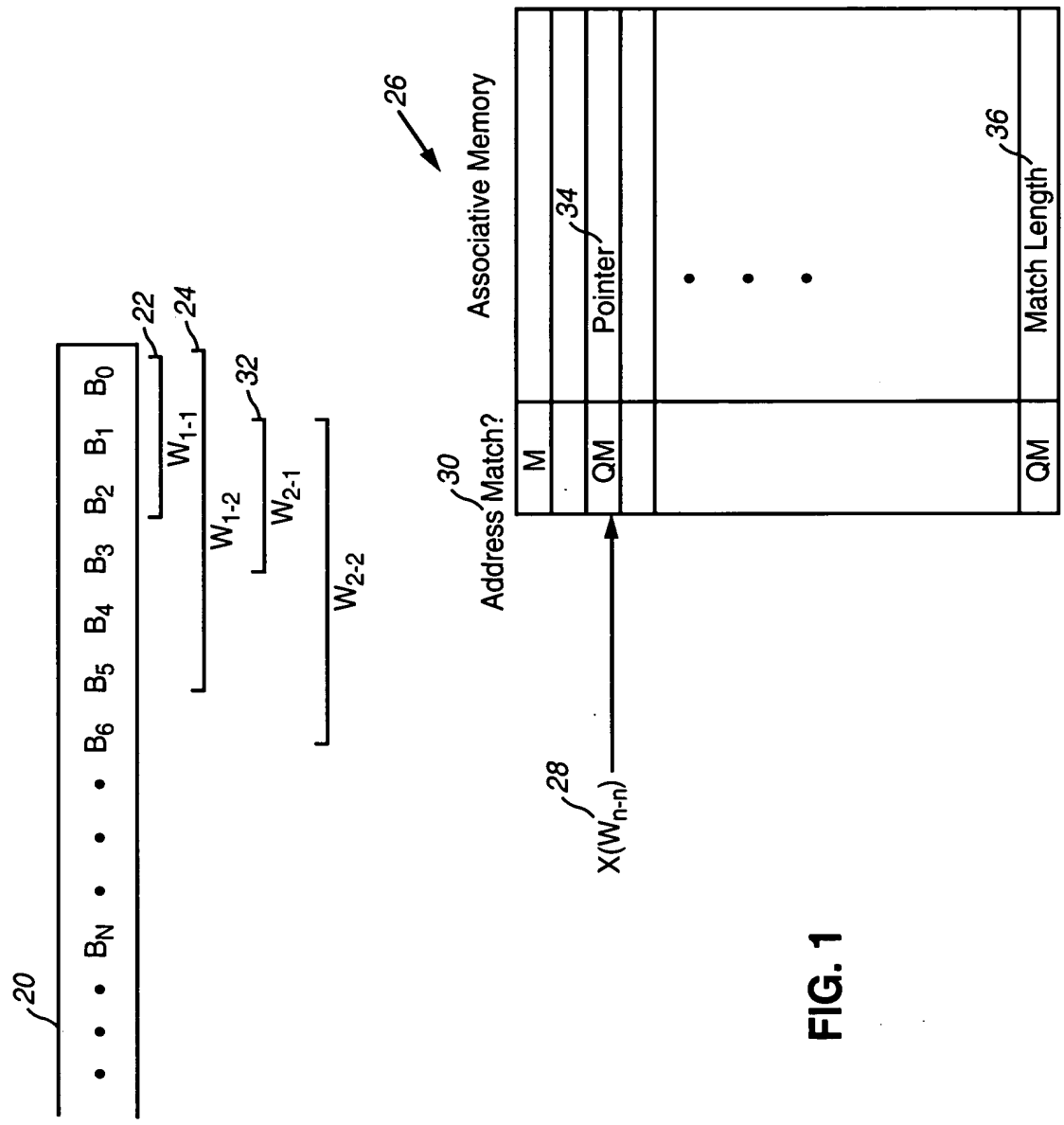
20
$B_N$ • • • $B_6$ $B_5$ $B_4$ $B_3$ $B_2$ $B_1$ $B_0$
22
24
32
$W_{1-1}$
$W_{1-2}$
$W_{2-1}$
$W_{2-2}$
26
Associative Memory
30
Address Match?
M
QM
34
Pointer
36
Match Length
QM
28
$X(W_{n-n})$

FIG. 1

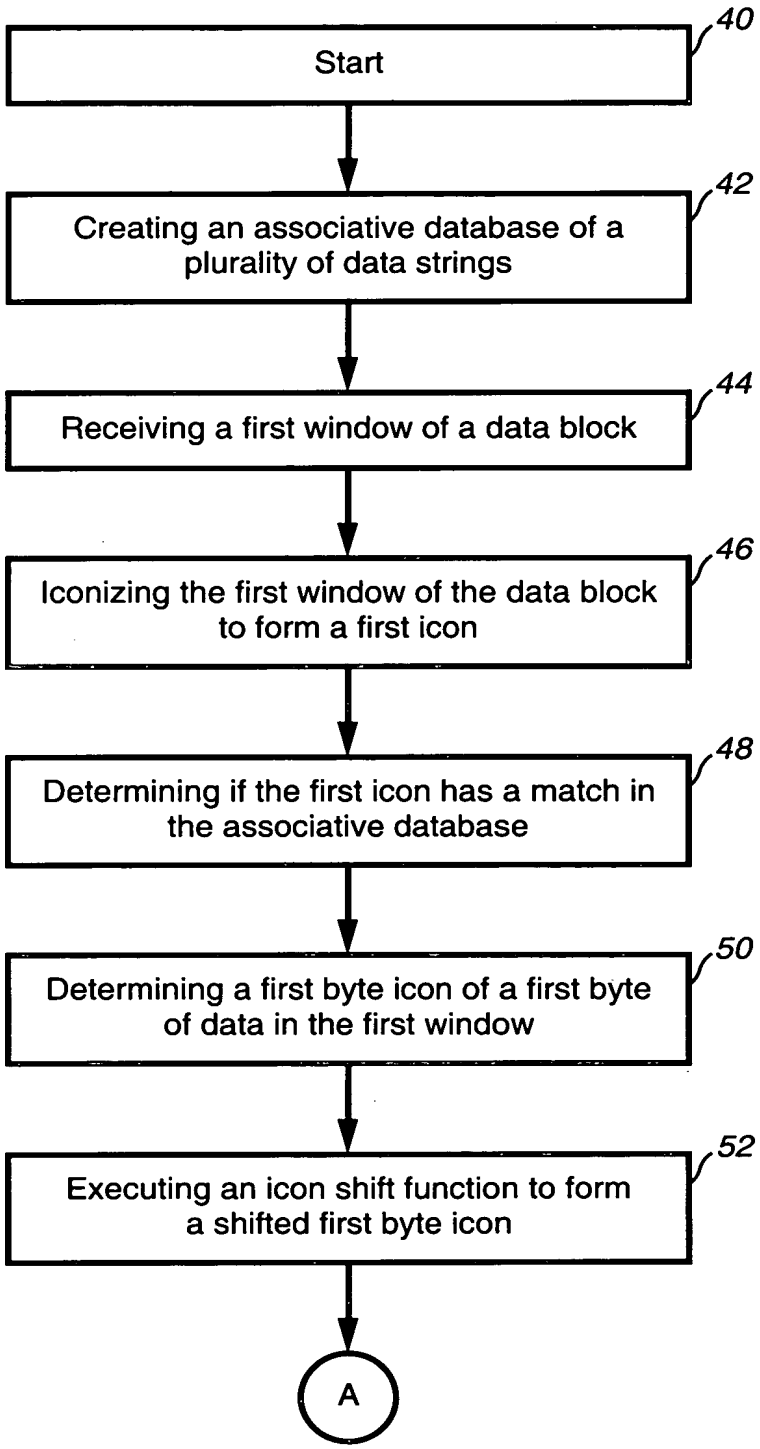
Start
40
Creating an associative database of a plurality of data strings
42
Receiving a first window of a data block
44
Iconizing the first window of the data block to form a first icon
46
Determining if the first icon has a match in the associative database
48
Determining a first byte icon of a first byte of data in the first window
50
Executing an icon shift function to form a shifted first byte icon
52
A

FIG. 2

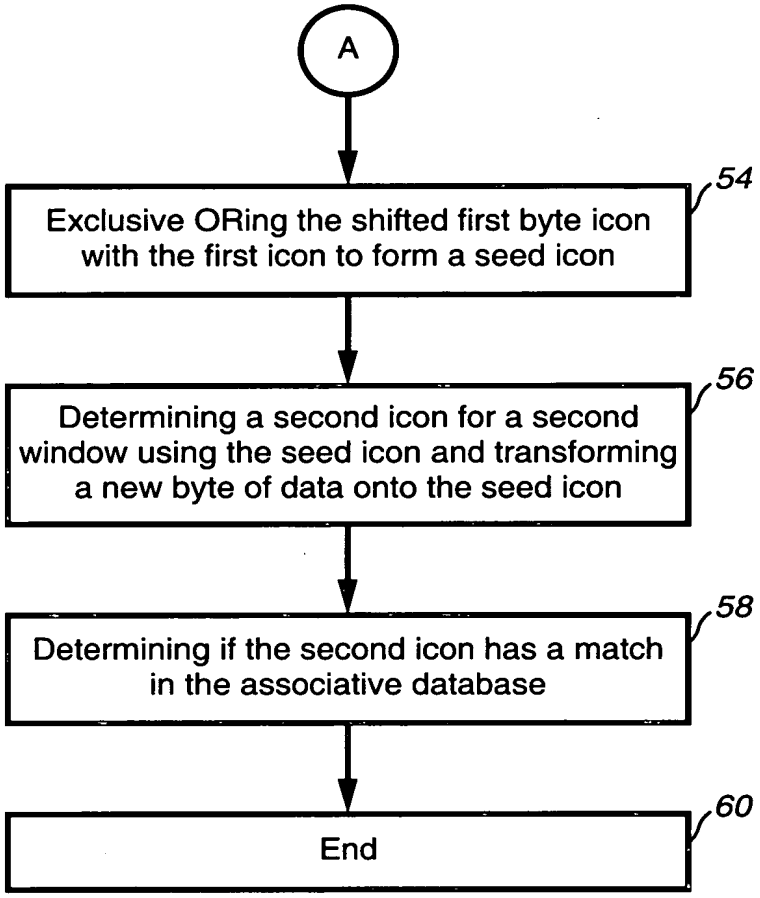
A
Exclusive ORing the shifted first byte icon with the first icon to form a seed icon
54
Determining a second icon for a second window using the seed icon and transforming a new byte of data onto the seed icon
56
Determining if the second icon has a match in the associative database
58
End
60

FIG. 3

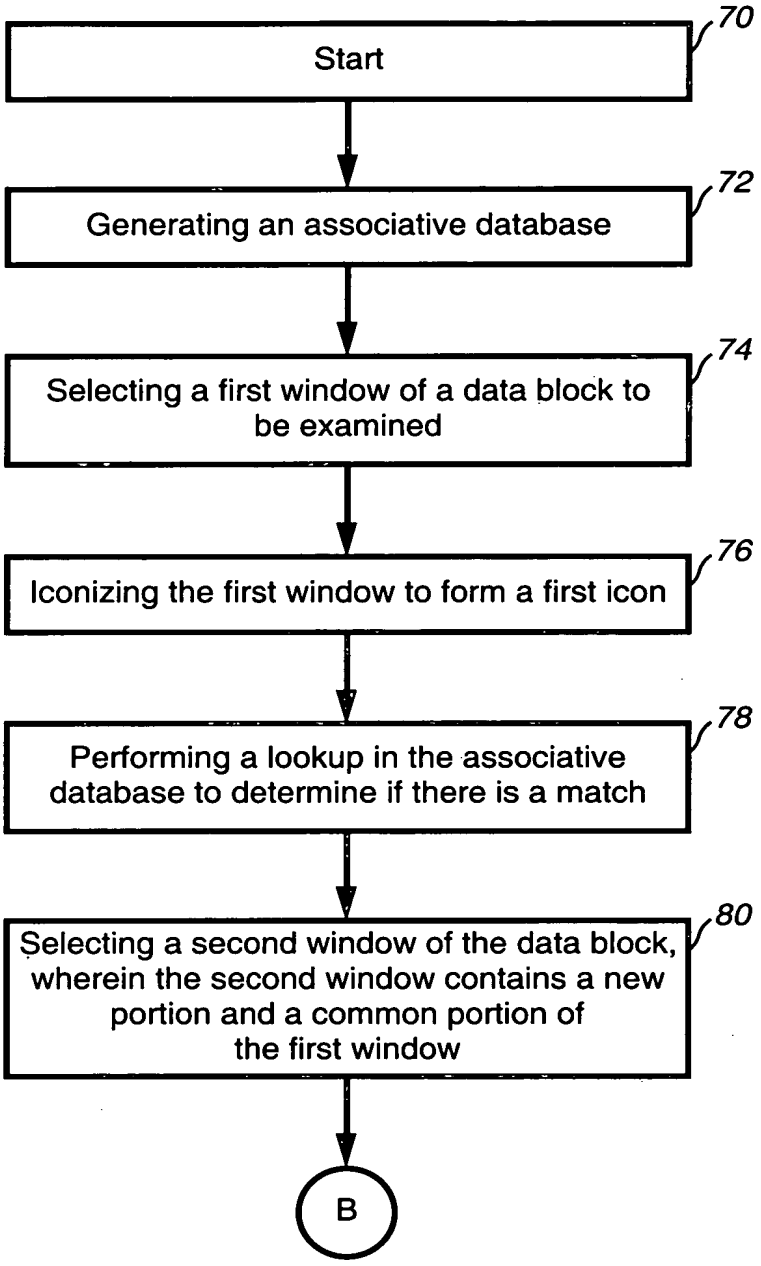
Start
70
Generating an associative database
72
Selecting a first window of a data block to be examined
74
Iconizing the first window to form a first icon
76
Performing a lookup in the associative database to determine if there is a match
78
Selecting a second window of the data block, wherein the second window contains a new portion and a common portion of the first window
80
B

FIG. 4

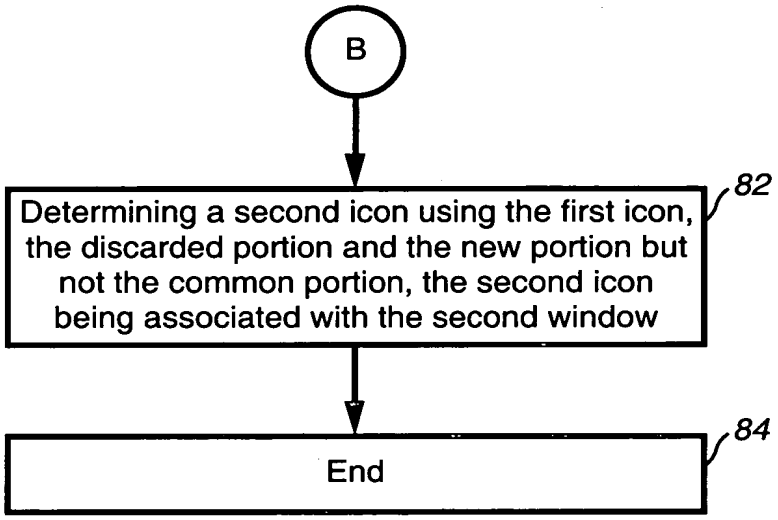
B
Determining a second icon using the first icon, the discarded portion and the new portion but not the common portion, the second icon being associated with the second window
82
End
84

FIG. 5

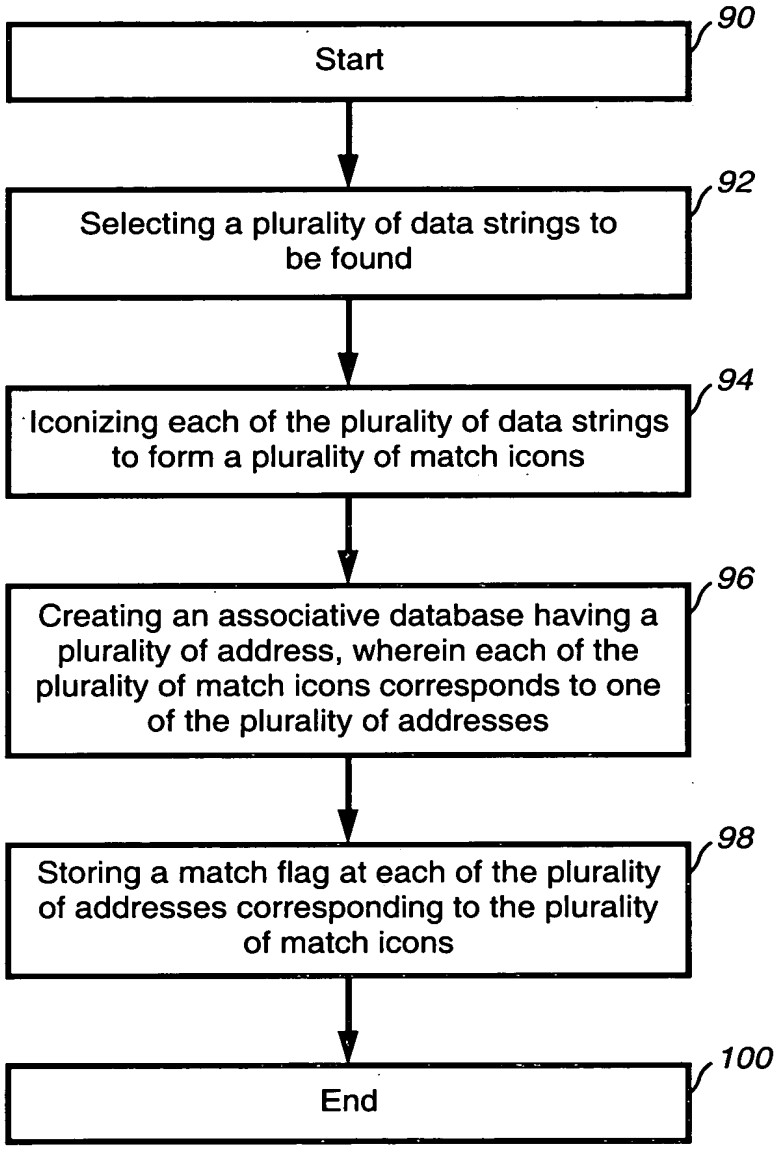
Start
90
Selecting a plurality of data strings to be found
92
Iconizing each of the plurality of data strings to form a plurality of match icons
94
Creating an associative database having a plurality of address, wherein each of the plurality of match icons corresponds to one of the plurality of addresses
96
Storing a match flag at each of the plurality of addresses corresponding to the plurality of match icons
98
End
100

FIG. 6

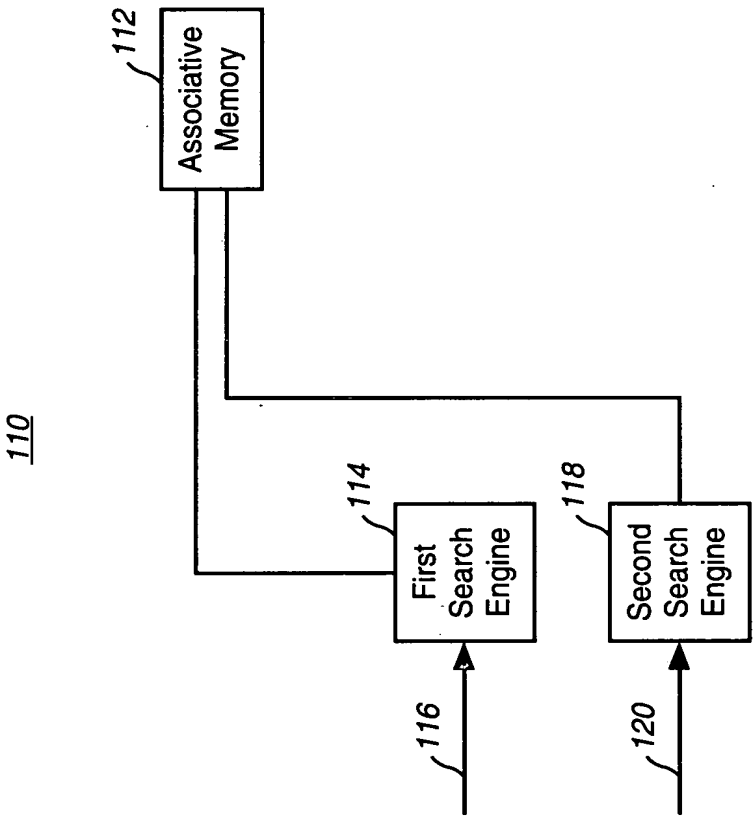
110
112
Associative Memory
114
First Search Engine
116
118
Second Search Engine
120

FIG. 7

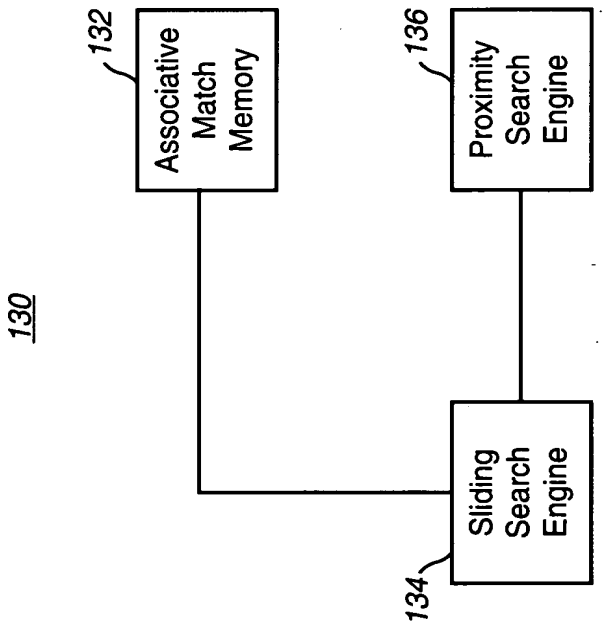
130
132
Associative Match Memory
136
Proximity Search Engine
Sliding Search Engine
134

FIG. 8

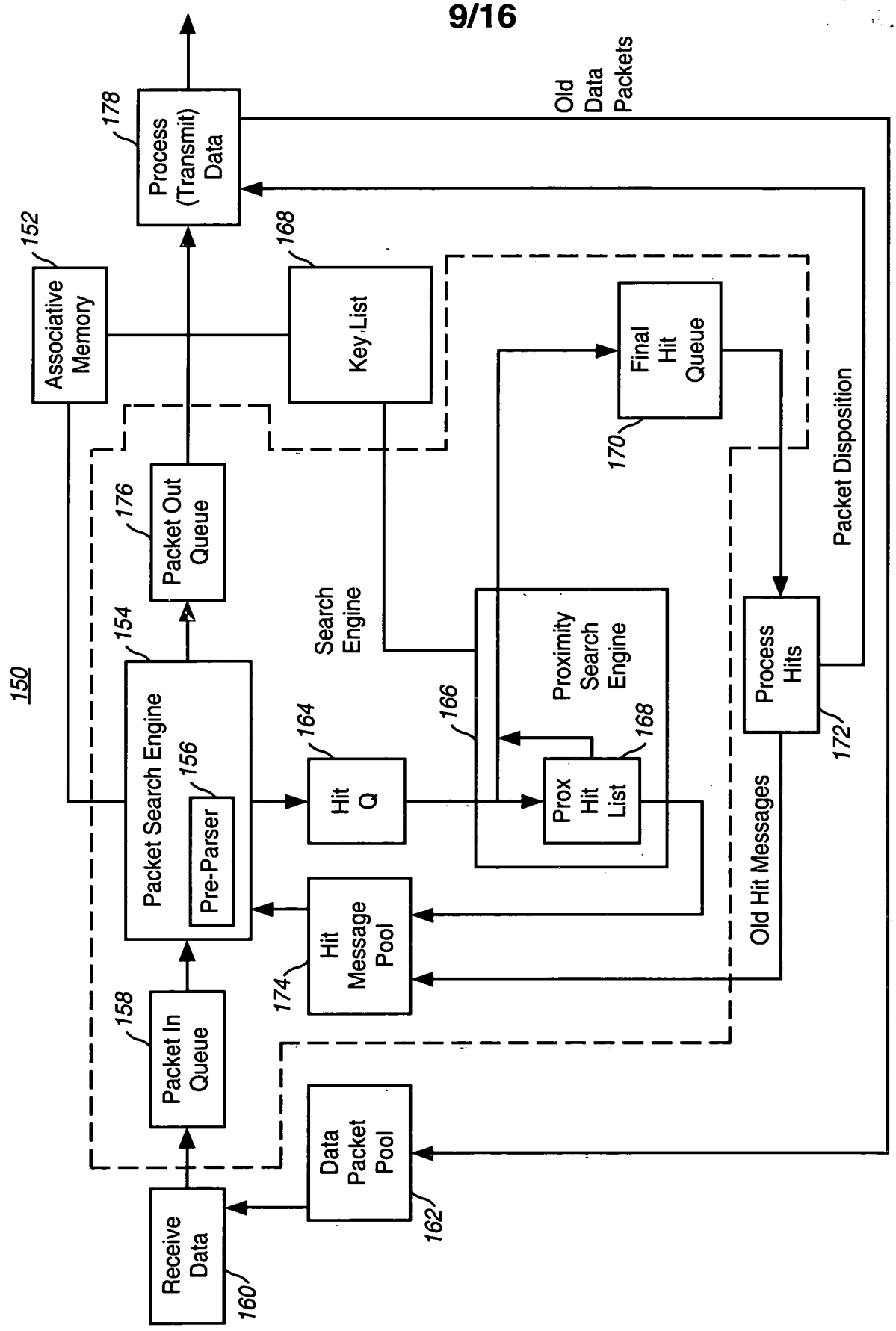
150
Receive Data
160
Packet In Queue
158
Packet Search Engine
154
Pre-Parser
156
Packet Out Queue
176
Process (Transmit) Data
178
Old Data Packets
Associative Memory
152
Key List
168
Search Engine
Hit Q
164
Hit Message Pool
174
Data Packet Pool
162
Proximity Search Engine
166
Prox Hit List
168
Final Hit Queue
170
Process Hits
172
Packet Disposition
Old Hit Messages

FIG. 9

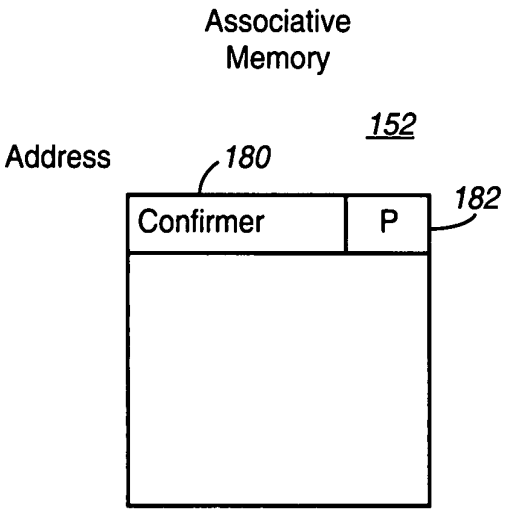


FIG. 10

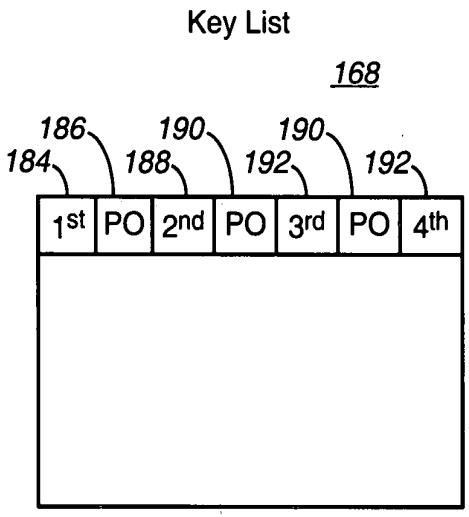


FIG. 11



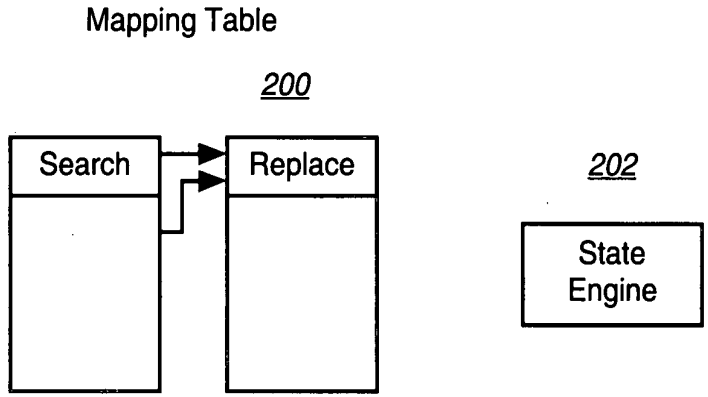


FIG. 12

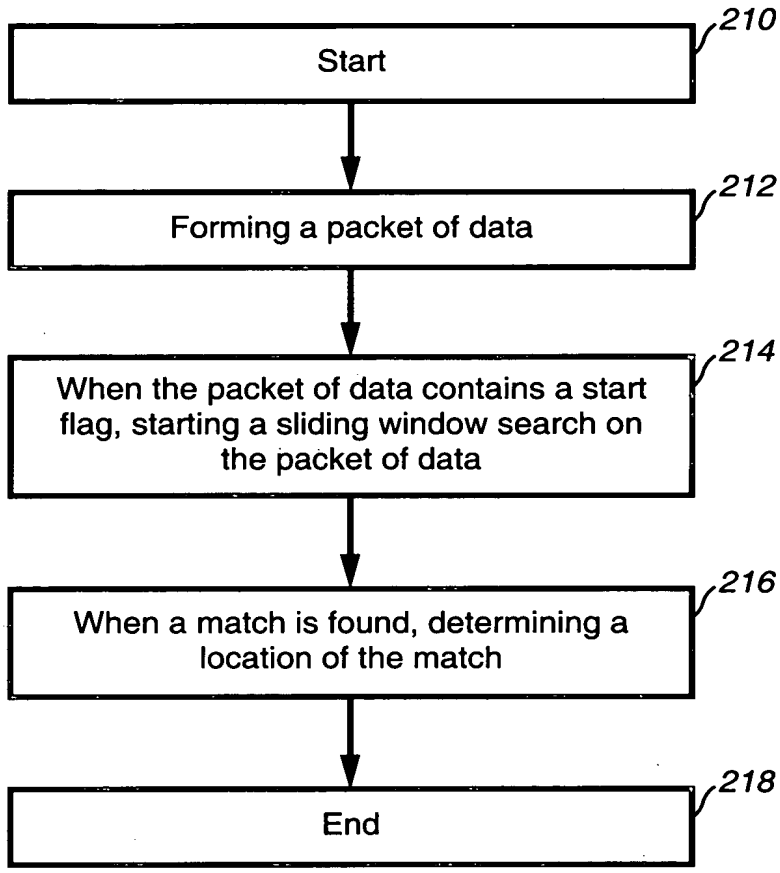
Start
210
Forming a packet of data
212
When the packet of data contains a start flag, starting a sliding window search on the packet of data
214
When a match is found, determining a location of the match
216
End
218

FIG. 13

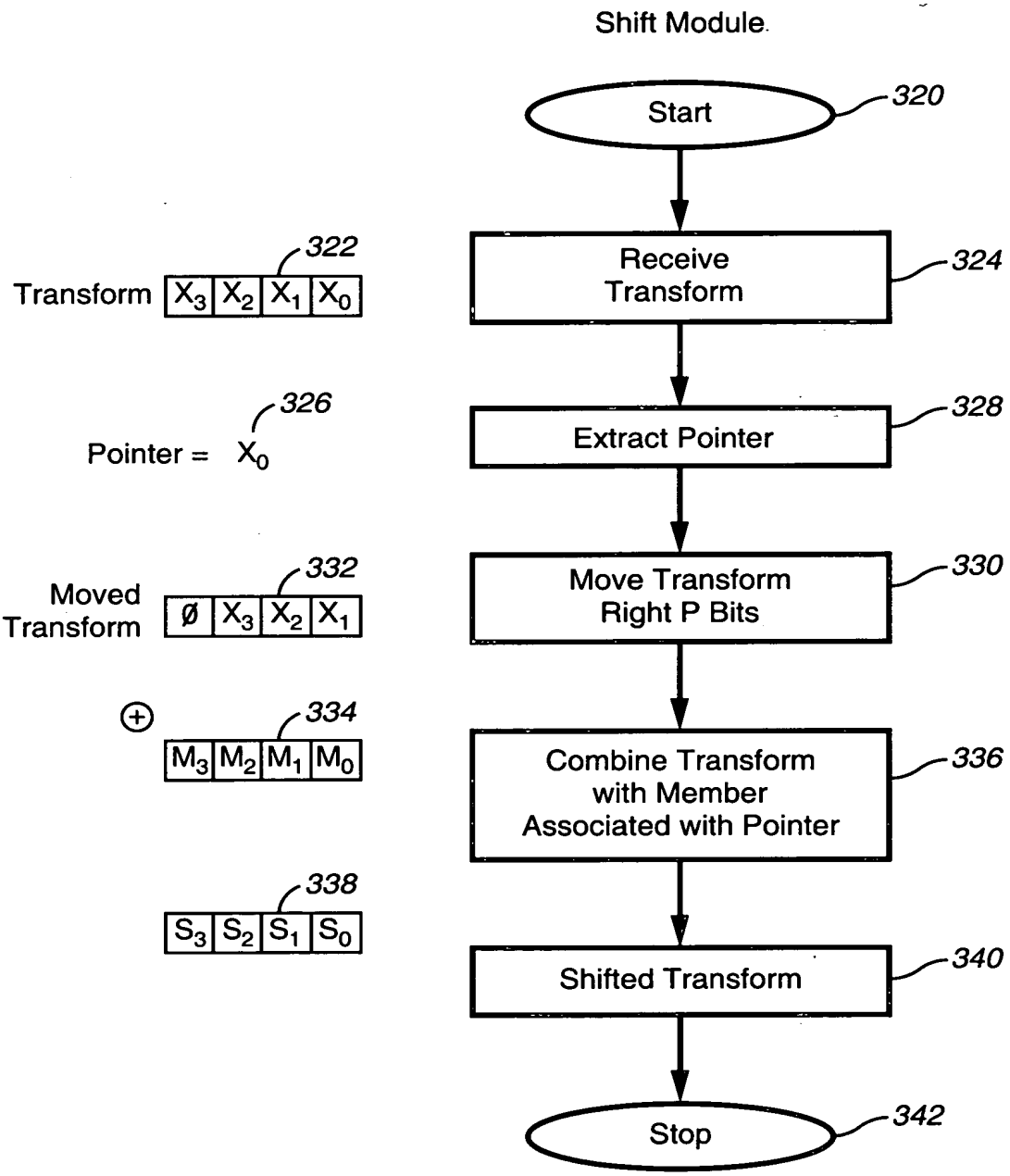
Shift Module
Start
320
Receive Transform
324
Extract Pointer
328
Move Transform Right P Bits
330
Combine Transform with Member Associated with Pointer
336
Shifted Transform
340
Stop
342
Transform
322
X3 X2 X1 X0
Pointer =
326
X0
Moved Transform
332
ø X3 X2 X1
334
M3 M2 M1 M0
338
S3 S2 S1 S0

FIG. 14

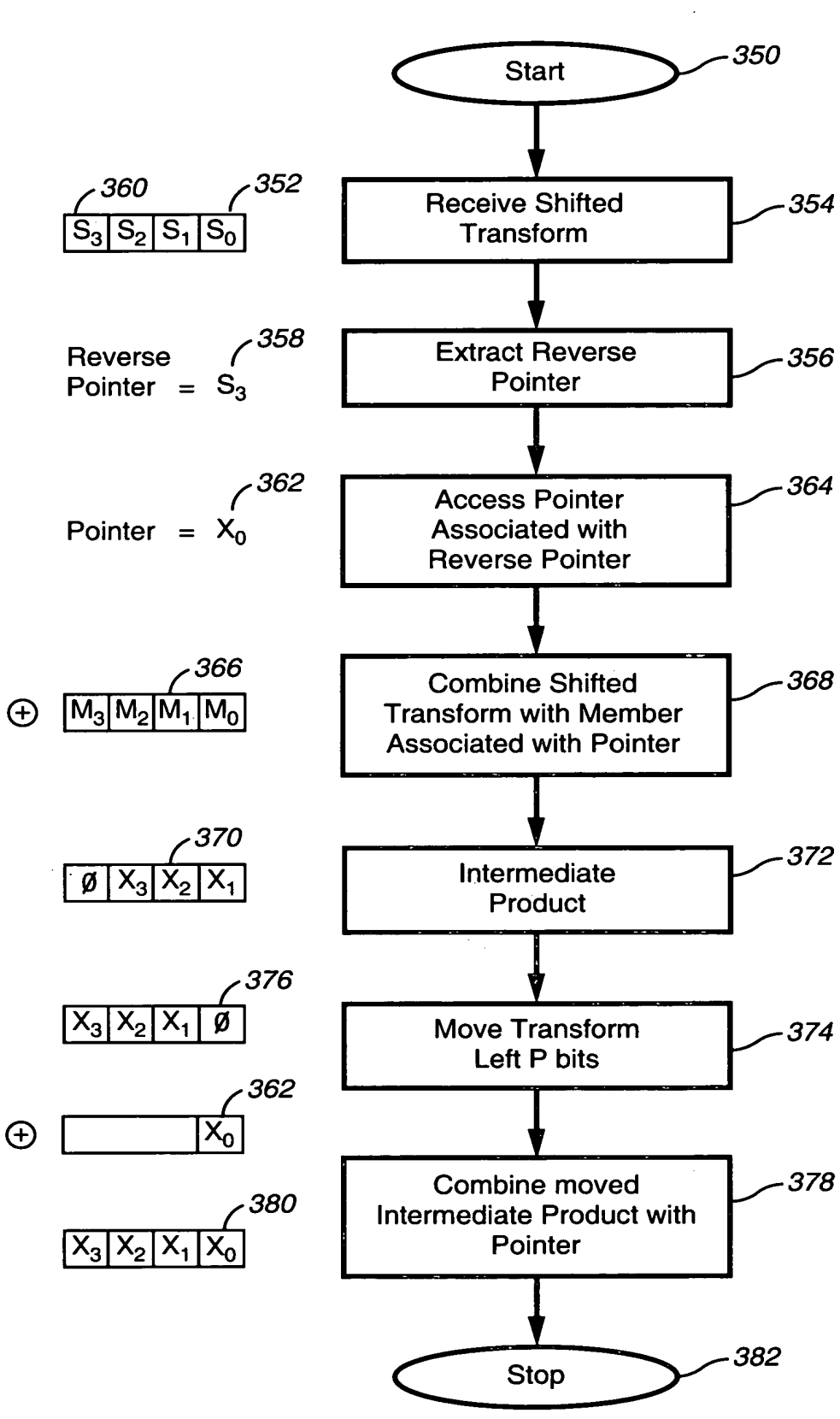
UNSHIFT Module
Start
350
Receive Shifted Transform
354
Extract Reverse Pointer
356
Access Pointer Associated with Reverse Pointer
364
Combine Shifted Transform with Member Associated with Pointer
368
Intermediate Product
372
Move Transform Left P bits
374
Combine moved Intermediate Product with Pointer
378
Stop
382
360
352
S3 S2 S1 S0
Reverse Pointer = S3
358
Pointer = X0
362
366
M3 M2 M1 M0
370
ø X3 X2 X1
376
X3 X2 X1 ø
362
X0
380
X3 X2 X1 X0

FIG. 15

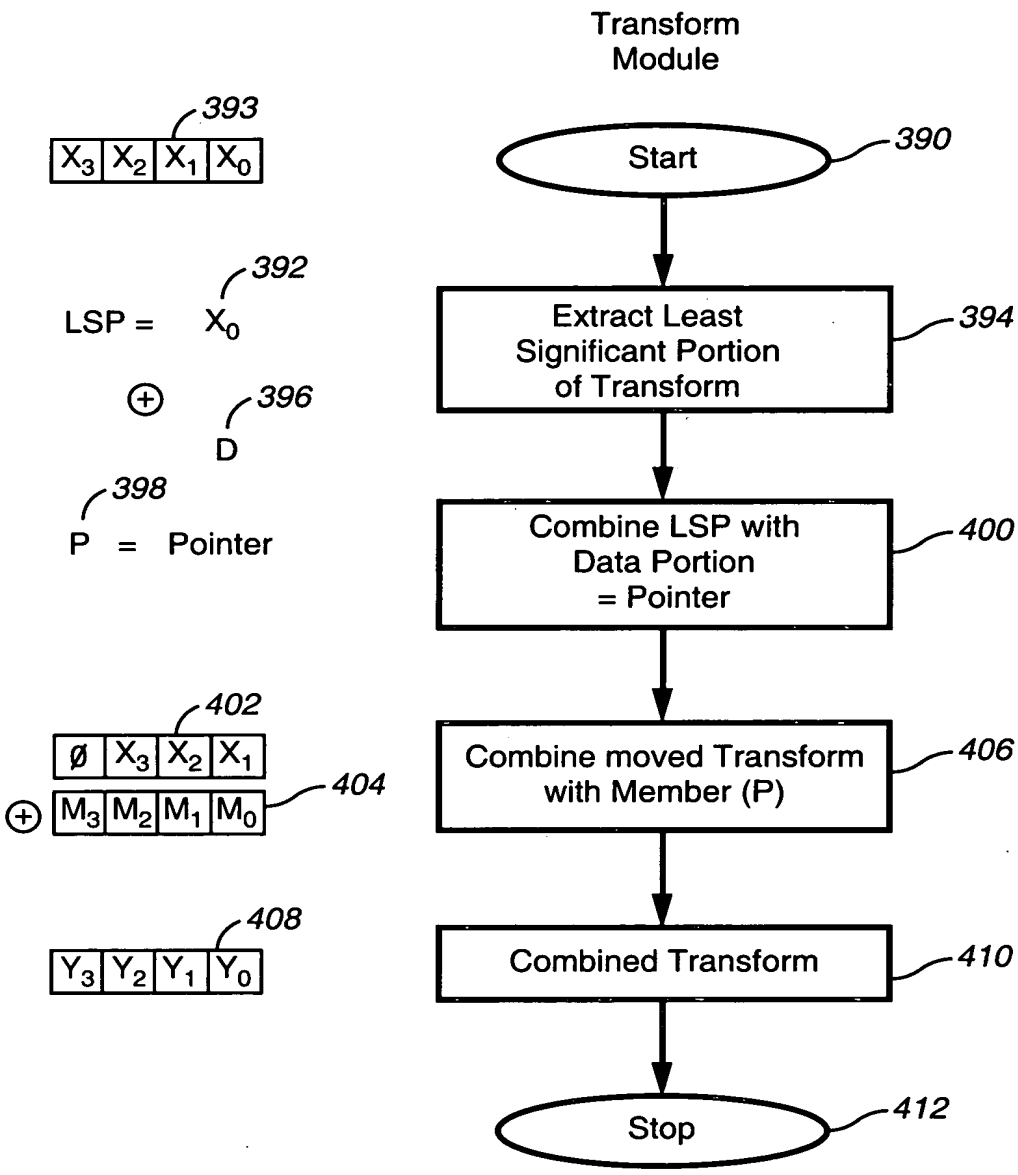
Transform Module
Start
390
Extract Least Significant Portion of Transform
394
Combine LSP with Data Portion = Pointer
400
Combine moved Transform with Member (P)
406
Combined Transform
410
Stop
412
393
X3 X2 X1 X0
392
LSP = X0
396
D
398
P = Pointer
402
Ø X3 X2 X1
404
M3 M2 M1 M0
408
Y3 Y2 Y1 Y0

FIG. 16

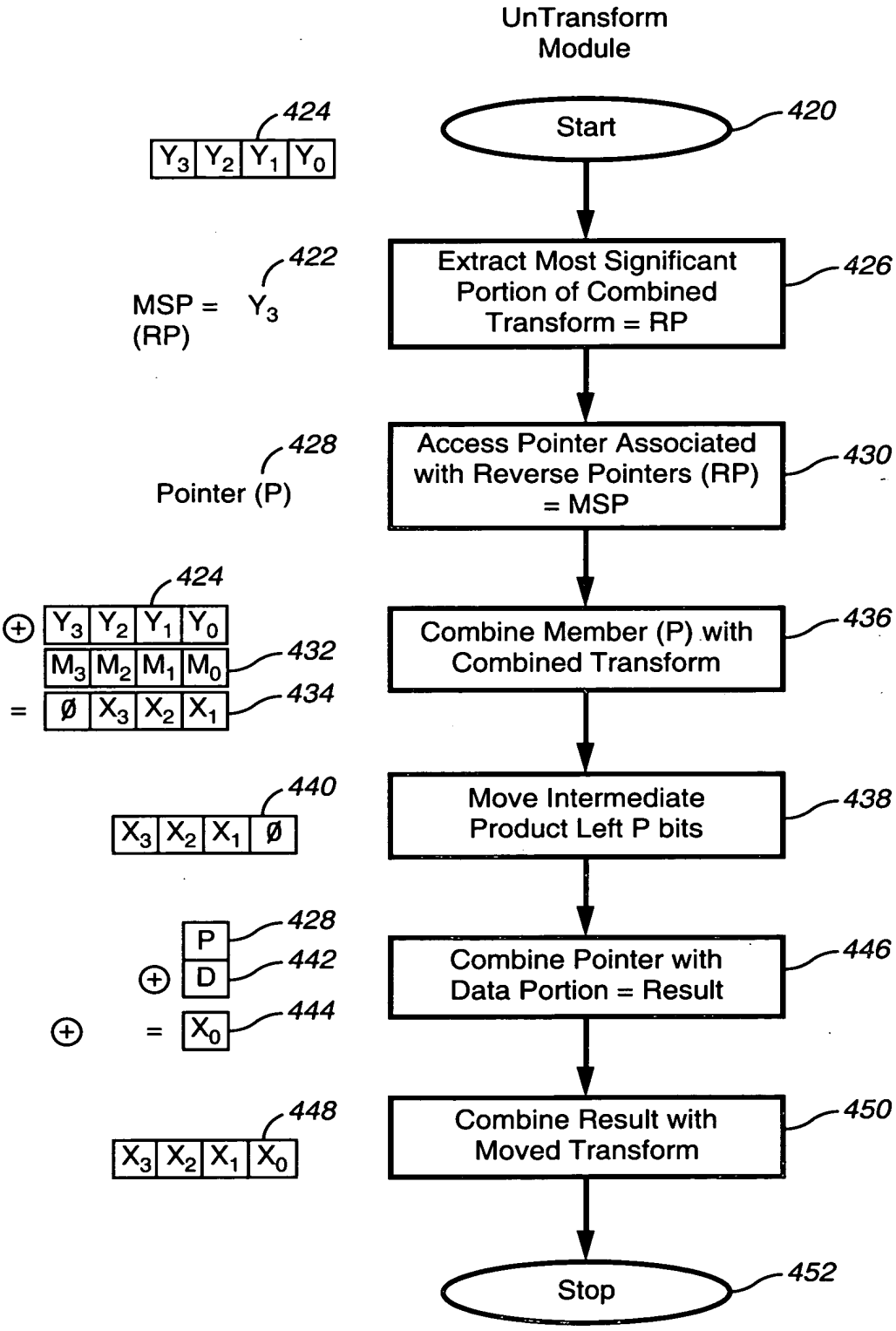
UnTransform Module
Start
420
Extract Most Significant Portion of Combined Transform = RP
426
Access Pointer Associated with Reverse Pointers (RP) = MSP
430
Combine Member (P) with Combined Transform
436
Move Intermediate Product Left P bits
438
Combine Pointer with Data Portion = Result
446
Combine Result with Moved Transform
450
Stop
452
424
Y3 Y2 Y1 Y0
422
MSP = (RP) Y3
428
Pointer (P)
424
Y3 Y2 Y1 Y0
M3 M2 M1 M0
432
= Ø X3 X2 X1
434
440
X3 X2 X1 Ø
428
P
442
D
444
= X0
448
X3 X2 X1 X0

FIG. 17

Transform Lookup Table:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 00- | 00000000 | 77073096 | EE0E612C | 990951BA | 076DC419 | 706AF48F | E963A535 | 9E6495A3 |
| 08- | 0EDB8832 | 79DCB8A4 | E0D5E91E | 97D2D988 | 09B64C2B | 7EB17CBD | E7B82D07 | 90BF1D91 |
| 10- | 1DB71064 | 6AB020F2 | F3B97148 | 84BE41DE | 1ADAD47D | 6DDDE4EB | F4D4B551 | 83D385C7 |
| 18- | 136C9856 | 646BA8C0 | FD62F97A | 8A65C9EC | 14015C4F | 63066CD9 | FA0F3D63 | 8D0B0DF5 |
| 20- | 3B6E20C8 | 4C69105E | D56041E4 | A2677172 | 3C03E4D1 | 4B04D447 | D20D85FD | A50AB56B |
| 28- | 35B5A8FA | 42B2986C | DBBBC9D6 | ACBCF940 | 32D86CE3 | 45DF5C75 | DCD60DCF | ABD13D59 |
| 30- | 26D930AC | 51DE003A | C8D75180 | BFD06116 | 21B4F4B5 | 56B3C423 | CFBA9599 | B8BDA50F |
| 38- | 2802B89E | 5F058808 | C60CD9B2 | B10BE924 | 2F6F7C87 | 58684C11 | C1611DAB | B6662D3D |
| 40- | 76DC4190 | 01DB7106 | 98D220BC | EFD5102A | 71B18589 | 06B6B51F | 9FBFE4A5 | E8B8D433 |
| 48- | 7807C9A2 | 0F00F934 | 9609A88E | E10E9818 | 7F6A0DBB | 086D3D2D | 91646C97 | E6635C01 |
| 50- | 6B6B51F4 | 1C6C6162 | 856530D8 | F262004E | 6C0695ED | 1B01A57B | 8208F4C1 | F50FC457 |
| 58- | 65B0D9C6 | 12B7E950 | 8BBEB8EA | FCB9887C | 62DD1DDF | 15DA2D49 | 8CD37CF3 | FBD44C65 |
| 60- | 4DB26158 | 3AB551CE | A3BC0074 | D4BB30E2 | 4ADFA541 | 3DD895D7 | A4D1C46D | D3D6F4FB |
| 68- | 4369E96A | 346ED9FC | AD678846 | DA60B8D0 | 44042D73 | 33031DE5 | AA0A4C5F | DD0D7CC9 |
| 70- | 5005713C | 270241AA | BE0B1010 | C90C2086 | 5768B525 | 206F85B3 | B966D409 | CE61E49F |
| 78- | 5EDEF90E | 29D9C998 | B0D09822 | C7D7A8B4 | 59B33D17 | 2EB40D81 | B7BD5C3B | C0BA6CAD |
| 80- | EDB88320 | 9ABFB3B6 | 03B6E20C | 74B1D29A | EAD54739 | 9DD277AF | 04DB2615 | 73DC1683 |
| 88- | E3630B12 | 94643B84 | 0D6D6A3E | 7A6A5AA8 | E40ECF0B | 9309FF9D | 0A00AE27 | 7D079EB1 |
| 90- | F00F9344 | 8708A3D2 | 1E01F268 | 6906C2FE | F762575D | 806567CB | 196C3671 | 6E6B06E7 |
| 98- | FED41B76 | 89D32BE0 | 10DA7A5A | 67DD4ACC | F9B9DF6F | 8EBEEFF9 | 17B7BE43 | 60B08ED5 |
| A0- | D6D6A3E8 | A1D1937E | 38D8C2C4 | 4FDFF252 | D1BB67F1 | A6BC5767 | 3FB506DD | 48B2364B |
| A8- | D80D2BDA | AF0A1B4C | 36034AF6 | 41047A60 | DF60EFC3 | A867DF55 | 316E8EEF | 4669BE79 |
| B0- | CB61B38C | BC66831A | 256FD2A0 | 5268E236 | CC0C7795 | BB0B4703 | 220216B9 | 5505262F |
| B8- | C5BA3BBE | B2BD0B28 | 2BB45A92 | 5CB36A04 | C2D7FFA7 | B5D0CF31 | 2CD99E8B | 5BDEAE1D |
| C0- | 9B64C2B0 | EC63F226 | 756AA39C | 026D930A | 9C0906A9 | EB0E363F | 72076785 | 05005713 |
| C8- | 95BF4A82 | E2B87A14 | 7BB12BAE | 0CB61B38 | 92D28E9B | E5D5BE0D | 7CDCEFB7 | 0BDBDF21 |
| D0- | 86D3D2D4 | F1D4E242 | 68DDB3F8 | 1FDA836E | 81BE16CD | F6B9265B | 6FB077E1 | 18B74777 |
| D8- | 88085AE6 | FF0F6A70 | 66063BCA | 11010B5C | 8F659EFF | F862AE69 | 6168FFD3 | 166CCF45 |
| E0- | A00AE278 | D70DD2EE | 4E048354 | 3903B3C2 | A7672661 | D06016F7 | 4969474D | 3E6E77DB |
| E8- | AED16A4A | D9D65ADC | 40DF0B66 | 37D83BF0 | A9BCAE53 | DEBB9EC5 | 47B2CF7F | 30B5FFE9 |
| F0- | BDB0F21C | CABAC28A | 53B39330 | 24B4A3A6 | BAD03605 | CDD70693 | 54DE5729 | 23D967BF |
| F8- | B3667A2E | C4614AB8 | 5D681B02 | 2A6F2B94 | B40BBE37 | C30C8EA1 | 5A05DF1B | 2D02EF8D |

FIG. 18

Transform Translation Table:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00- | 00 | 41 | C3 | 82 | 86 | C7 | 45 | 04 | 4D | 0C | 8E | CF | CB | 8A | 08 | 49 |
| 10- | 9A | DB | 59 | 18 | 1C | 5D | DF | 9E | D7 | 96 | 14 | 55 | 51 | 10 | 92 | D3 |
| 20- | 75 | 34 | B6 | F7 | F3 | B2 | 30 | 71 | 38 | 79 | FB | BA | BE | FF | 7D | 3C |
| 30- | EF | AE | 2C | 6D | 69 | 28 | AA | EB | A2 | E3 | 61 | 20 | 24 | 65 | E7 | A6 |
| 40- | EA | AB | 29 | 68 | 6C | 2D | AF | EE | A7 | E6 | 64 | 25 | 21 | 60 | E2 | A3 |
| 50- | 70 | 31 | B3 | F2 | F6 | B7 | 35 | 74 | 3D | 7C | FE | BF | BB | FA | 78 | 39 |
| 60- | 9F | DE | 5C | 1D | 19 | 58 | DA | 9B | D2 | 93 | 11 | 50 | 54 | 15 | 97 | D6 |
| 70- | 05 | 44 | C6 | 87 | 83 | C2 | 40 | 01 | 48 | 09 | 8B | CA | CE | 8F | 0D | 4C |
| 80- | 95 | D4 | 56 | 17 | 13 | 52 | D0 | 91 | D8 | 99 | 1B | 5A | 5E | 1F | 9D | DC |
| 90- | 0F | 4E | CC | 8D | 89 | C8 | 4A | 0B | 42 | 03 | 81 | C0 | C4 | 85 | 07 | 46 |
| A0- | E0 | A1 | 23 | 62 | 66 | 27 | A5 | E4 | AD | EC | 6E | 2F | 2B | 6A | E8 | A9 |
| B0- | 7A | 3B | B9 | F8 | FC | BD | 3F | 7E | 37 | 76 | F4 | B5 | B1 | F0 | 72 | 33 |
| C0- | 7F | 3E | BC | FD | F9 | B8 | 3A | 7B | 32 | 73 | F1 | B0 | B4 | F5 | 77 | 36 |
| D0- | E5 | A4 | 26 | 67 | 63 | 22 | A0 | E1 | A8 | E9 | 6B | 2A | 2E | 6F | ED | AC |
| E0- | 0A | 4B | C9 | 88 | 8C | CD | 4F | 0E | 47 | 06 | 84 | C5 | C1 | 80 | 02 | 43 |
| F0- | 90 | D1 | 53 | 12 | 16 | 57 | D5 | 94 | DD | 9C | 1E | 5F | 5B | 1A | 98 | D9 |

FIG. 19